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EXAMINER	
WALTER, CRAIG E	

ART UNIT	PAPER NUMBER
2188	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/826,757	REGER ET AL.	
	Examiner	Art Unit	
	CRAIG E. WALTER	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14-16* is/are allowed.

6)☒ Claim(s) *1-13,17 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/21/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-18 are pending in the Application.

Claims 1, 7 and 13 are amended.

Claims 1-13, 17 and 18 are rejected.

Claims 14-16 are allowable.

Claims 17 and 18 are new.

Response to Amendment

2. Applicant's amendments and arguments filed on 21 December 2007 in response to the office action mailed on 21 September 2007 have been fully considered, but they are rendered moot in view of the new grounds of rejection presented below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 7-9, 12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeKoning et al. (US Patent 5,975,738), hereinafter DeKoning, and in further view of Dimmick et al. (US Patent 5,193,050), hereinafter Dimmick.

As for claim 1, DeKoning teaches a method of reconfiguring a storage system,

the method comprising:

operating a standalone storage server (Fig. 3, controller 118.2, data connections 150.2, and disk drives 110) which includes a plurality of mass storage devices (elements 110) and a first storage server head (element 118.2) to access the mass storage devices in response to client requests (element 120.2), wherein the first storage server head has ownership of the plurality of mass storage devices (referring to Fig. 3, the standalone storage server contains a controller (i.e. head – 118.2), connected to a plurality of mass storage devices (elements 110). The controller receive access requests via one of the hosts (elements 120.1, 120.2) – col. 8, ll. 42-55. Each LUN within the array of storage devices is associated (i.e. assigned) to one of the two controllers as primary controller within the standalone storage server. The remaining controller (outside the standalone storage server) is the secondary or redundant controller); and

Note the configuration in Fig. 3 does not depict a RAID configuration for the storage devices as shown in Fig. 1. For example, DeKoning draws a distinction between a RAID array (element 108) comprising multiple disks (elements 110) in Fig. 1, with the disks (elements 110) in Fig. 3 (not labeled as an array, element 108) – see col. 6, ll. 9-17).

converting the standalone storage server into a JBOD set (the controllers depicted in Fig. 3 are interchangeable so as to allow a failing controller unit to be easily disconnected and removed from the storage subsystem (col. 13, ll. 31-65 – Fig. 10 flow chart). Note once the server head is disconnected from the array of disks, the

remaining controller (elements 118.1) takes over control of the system. Once the non-failing controller takes over (second controller for example), the system no longer functions as a "standalone sever" because the standalone server's controller failed. Once the second controller takes over the disks are accessed by the second controller (118.1), but only as individual disks (e.g. JBOD)); and

integrating the JBOD set into a modular storage server system to enable the plurality of mass storage devices to be controlled by a second storage server head (again, the controllers are interchangeable so as to allow a failing controller unit to be easily disconnected and removed from the storage subsystem (col. 13, ll. 31-65 – Fig. 10 flow chart), including reassigning ownership of at least one of the mass storage devices to the second storage server head, independently of a configuration of physical connection which connects the second storage server head to the plurality of mass storage devices (the redundant controller assumes ownership of the LUNs if a failure is detected in the primary controller – Fig. 10).

Despite these teachings, DeKoning fails to teach his standalone storage server as being within a chassis, wherein the second storage server head is external to the chassis as recited in this claim.

Dimmick however teaches a enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems (col. 1, lines 7-11) – see also Fig. 1.

It would have been obvious to one of ordinary skill in the art at the time of the

invention for DeKoning to further include Dimmick's enclosure for subsystems into his own standalone server utilizing his method for detecting failures in a redundant controller. By doing so, DeKoning could benefit by having a fully integrated storage server, capable of being quickly inserted and removed without requiring any changes to the remainder of the system as taught by Dimmick in col. 1, lines 28-40.

As for claims 2, 7 and 17, DeKoning teaches a method of reconfiguring a storage system, the method comprising:

operating a standalone storage server (Fig. 3, controller 118.2, data connections 150.2, and disk drives 110) which includes a plurality of mass storage devices (elements 110) and a first storage server head (element 118.2) to access the mass storage devices in response to client requests (element 120.2), wherein the first storage server head has ownership of the plurality of mass storage devices (referring to Fig. 3, the standalone storage server contains a controller (i.e. head – 118.2), connected to a plurality of mass storage devices (elements 110). The controller receive access requests via one of the hosts (elements 120.1, 120.2) – col. 8, ll. 42-55. Each LUN within the array of storage devices is associated (i.e. assigned) to one of the two controllers as primary controller within the standalone storage server. The remaining controller (outside the standalone storage server) is the secondary or redundant controller); and

Note the configuration in Fig. 3 does not depict a RAID configuration for the storage devices as shown in Fig. 1. For example, DeKoning draws a distinction between a RAID array (element 108) comprising multiple disks (elements 110) in Fig. 1,

with the disks (elements 110) in Fig. 3 (not labeled as an array, element 108) – see col. 6, ll. 9-17).

converting the standalone storage server into a JBOD set (the controllers depicted in Fig. 3 are interchangeable so as to allow a failing controller unit to be easily disconnected and removed from the storage subsystem (col. 13, ll. 31-65 – Fig. 10 flow chart). Note once the server head is disconnected from the array of disks, the remaining controller (elements 118.1) takes over control of the system. Once the non-failing controller takes over (second controller for example), the system no longer functions as a "standalone sever" because the standalone server's controller failed. Once the second controller takes over the disks are accessed by the second controller (118.1), but only as individual disks (e.g. JBOD), including:

> disconnecting and removing the storage server head from the mass storage devices (the controllers are interchangeable so as to allow a failing controller unit to be easily disconnected and removed from the storage subsystem (col. 13, ll. 31-65 – Fig. 10 flow chart));
>
> connecting an external storage server head unit to the mass storage devices (DeKoning teaches connecting both a primary and a secondary controller to the storage subsystem. Once it has been determined that the primary controller has failed, the connection between the secondary controller and the storage units is enabled allowing for control to pass to the secondary controller – Fig. 10 flow chart. It is worthy to note that external storage controller (i.e. head) is in fact external, as it is external to the drives as shown in Fig. 3);

and using a command to reassign ownership of the plurality of mass storage devices from the storage server head to the external storage server head unit (the determination if ownership needs to be reassigned is performed via a process of exchanging software commands as per col. 4, lines 33-63).

DeKoning however fails to teach the standalone storage server as being installed in a chassis prior to converting the standalone storage server into a JBOD set, and installing an I/O module within the chassis to act as an interface between the mass storage devices installed in the chassis and an external storage server head unit (as recited by Applicant in both claims 2 and 7).

Dimmick however teaches an enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems. Dimmick additionally teaches an I/O unit within his chassis (an I/O device interfacing devices inside and outside the chassis is inherent in a system such as Dimmick's, else the external and internal devices with respect to the chassis would not be able to communicate (col. 1, lines 7-11) – see also Fig. 3.

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Dimmick's enclosure for subsystems into his own standalone server utilizing his method for detecting failures in a redundant controller. By doing so, DeKoning could benefit by having a fully integrated storage server, capable of being quickly inserted and removed without requiring any changes to the remainder of the system as taught by Dimmick in col. 1, lines 28-40.

As for claim 12, though DeKoning teaches a storage server head (i.e. controller), he fails to specifically teach it as being implemented on a single circuit board.

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to integrate his controller (i.e. the CPU, memory and cache which comprise the controller) onto a single circuit board. By doing so, he could exploit the well-known benefits of integrated circuits utilizing a single circuit board, including improved interchangeability, and improved signal timing and integrity of the components.

DeKoning additionally fails to teach installing the controller within the chassis as recited by Applicant. Dimmick however teaches an enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems (col. 1, lines 7-11) – see also Fig. 1.

As for claim 3, though DeKoning fails to teach his second storage server as being external to the chassis, Dimmick however teaches an enclosure for electronic subsystems in a data processing system, which he teaches the use of a single enclosure (i.e. chassis) incorporating several individual modules to form an integrated subsystem for data processing systems (col. 1, lines 7-11) – see also Fig. 3.

It would have been obvious to one of ordinary skill in the art at the time of the invention for DeKoning to further include Dimmick's enclosure for subsystems into his own standalone server utilizing his method for detecting failures in a redundant controller. By doing so, DeKoning could benefit by having a fully integrated storage

server, capable of being quickly inserted and removed without requiring any changes to the remainder of the system as taught by Dimmick in col. 1, lines 28-40.

As for claim 4, DeKoning teaches removing the failing unit once it's detected in order to transfer ownership to the redundant controller (col. 6, line 63 through col. 7, line 12).

As for claim 5, DeKoning teaches the reassigning ownership of at least one of the mass storage devices comprises using a software-based command to reassign ownership of said at least one of the mass storage devices (the determination if ownership needs to be reassigned is performed via a process of exchanging software commands as per col. 4, lines 33-63).

As for claim 8, DeKoning teaches using a command to reassign ownership of the plurality of mass storage devices as comprising reassigning ownership of the mass storage devices independently of how the plurality of mass storage devices and the external storage head unit are physically interconnected (the redundant controller assumes ownership of the LUNs if a failure is detected in the primary controller – col. 13, ll. 31-65 – Fig. 10 flow chart. Also note the determination to reassigned ownership is performed via a process of exchanging software commands as per col. 4, lines 33-63).

As for claim 9, DeKoning teaches using a command to reassign ownership of the plurality of mass storage devices as comprising reassigning ownership of the mass storage devices without removing any of the mass storage devices (unlike his teachings for the controllers which are interchangeable, DeKoning does not require that the drives

themselves be swapped out during the reassignment process (i.e. reassignment may occur either via software commands, or via physical swapping of the controllers)).

4. Claims 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of DeKoning (US Patent 5,975,738) and Dimmick (US Patent 5,193,050) as applied to claims 5 and 7 above respectively, and in further view of Brunelle et al. (US Patent 6,654,902 B1), hereinafter Brunelle.

As for claim 6, though the combined teachings of DeKoning and Dimmick disclose arbitrating ownership of a plurality of disks between multiple controllers, they fail to specifically teach storing ownership attribute bits in the disks themselves.

Brunelle however teaches a system for persistent reservation IO barriers in which a storage device itself stores an ownership identifier depending on which resource (i.e. computer) has access to that device (col. 2, lines 21-51).

As for claim 10, through the combined teachings of DeKoning and Dimmick meet all the limitations of claim 7, they fail to specifically teach storing ownership attribute bits in the disks themselves.

Brunelle however teaches a system for persistent reservation IO barriers in which a storage device itself stores an ownership identifier depending on which resource (i.e. computer) has access to that device (col. 2, lines 21-51).

It would have been obvious to one of ordinary skill in the art at the time of the invention for the combined teachings of DeKoning and Dimmick to further include Brunelle's system of persistent reservation IO barriers into his own method for detecting failure in redundant controllers using a private LUN. By doing so, they could exploit the

benefits of preventing unauthorized access to his system by increasing the system's security via Brunelle's use of a registration key as taught by Brunelle in col. 1, lines 33-51.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of DeKoning (US Patent 5,975,738) and Dimmick (US Patent 5,193,050) as applied to claim 7 above, and in further view of Weber (US PG Publication 2003/0105931 A1).

As for claim 11, though the combined teachings of Dekoning and Dimmick teach all the limitations of claim 7, they fail to teach connecting the external storage server head unit to a second plurality of mass storage devices, wherein the external storage server head unit further has ownership of the second plurality of mass storage devices.

Weber however teaches an architecture for transparent mirroring, which utilizes a redundant controller, remote from the primary controller connected to mirrored data storage devices (see Fig. 1, element 106 and paragraph 0027, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for the combined teachings of DeKoning and Dimmick to further include Weber's mirroring method into his own method for detecting failure in redundant controllers using a private LUN. By doing so, they could benefit by preventing catastrophic system failure by mirroring critical data at a geographically remote location, hence enabling persistent access to critical uncorrupted data as taught by Weber in paragraphs 0001 and 0006, all lines.

6. Claims 13 and 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over

the combined teachings of DeKoning (US Patent 5,975,738) and Dimmick (US Patent 5,193,050) as applied to claims 7 and 17 above respectively, and in further view of White (US Patent 6,473,371 B1)

As for claims 13 and 18, though Dekoning in view of Dimmick teach an I/O device installed in a chassis, they don't explicitly teach installing the I/O device within the chassis in place of the failing controller.

White however teaches a media handling device having replaceable modules in which modules may be replaced via the use of removable modules in case of a failure (col. 2, ll. 35-58).

It would have been obvious to one of ordinary skill in the art at the time of the invention for the combined teachings of Dekoning and Dimmick to further include White's media handling device with replaceable modules into their own system for detecting failures with redundant controllers. By doing so, they would be able to exploit the benefits of an auto changer, used to automatically replace failing components, hence saving time, and minimizing system downtime as taught by White in col. 1, ll. 13-32.

Allowable Subject Matter

7. Claims 14-16 are allowed for the reasons made of record 20 April 2007.

Response to Arguments

8. Applicant's arguments with respect to claim 1 have been fully considered. Applicant's argument I. (i.e. allegedly not all limitations are shown by the cited references) is rendered moot in view of the new grounds of rejection presented *supra* in light of the amendments. For example, Examiner previously used Dekoning's first embodiment to reject claim 1 (Fig. 1), however Examiner presently relies upon Dekoning's second embodiment (Fig. 3) to reject the instant claims. As such, any arguments Applicant set forth with respect to the first embodiment is rendered moot.

Several arguments set forth against the previously asserted rejection for claim 1 are still germane to Examiner's new interpretation of Dekoning, however those arguments were fully considered, but they are not persuasive for the reasons stated below.

With respect to argument II. (i.e. allegedly the rejection is procedurally inaccurate), Applicant contends that the Office concedes that Dekoning fails to teach a second server head as being external to the chassis, however sets forth that Dimmick teaches this limitation. Applicant alleges that the Office sets forth this assertion without a showing demonstrating Dimmick teaching this alleged deficiency. This argument however is not persuasive; as it appears Applicant misconstrued Examiner's interpretation of exactly how Dekoning in view of Dimmick render the claim obvious.

Examiner maintains (as per the rejection above) that Dekoning fails to teach the standalone server as being within a chassis. Dimmick's disclosure clearly demonstrates a chassis comprising multiple components (as per the rejection above). Examiner

maintains that it would have been obvious for Dekoning to enclose his standalone server (e.g. one controller, data connections, and two storage devices) into a chassis for the reasons made of record (page 8, ll. 11-16 of the Office action mailed 20 September 2007 for example). By enclosing these elements within the chassis, the remaining controller would in fact be external to the chassis. It appears that Applicant concedes that it is in fact obvious to an artisan of ordinary skill to put ***all*** the components into a chassis as taught by Dimmick. Seemingly, the point of contention between Applicant and the Office is whether or not it would have been obvious to put some, but not all components, into a chassis such as the one illustrated by Dimmick. Examiner maintains that in fact it would have been obvious to an artisan of ordinary skill to put some but not all of Dekoning's components into a single chassis. By doing so, the controller external to the chassis would be not be affected by a catastrophic event/failure which would in fact affect all of the elements with the chassis.

Applicant further contends that the Office action fails to establish that it would be obvious to combine these two references, and further fails to provide motivation to do so. This argument however is rendered moot, as Examiner directs Applicant to page 8, ll. 11-16 of the Office action mailed 21 September 2007, which illustrates explicit motivation to combine extracted from Dimmick's teachings.

With respect to Applicant's argument under heading III. (Dimmick allegedly teaches away), Examiner maintains that Dimmick does not in fact teach away from the use of an external storage head for the reasons stated in the preceding paragraphs of Examiner's retort *supra*, Applicant's arguments notwithstanding.

With respect to the argument under heading IV. (the invention as a whole is allegedly not obvious), Applicant's arguments are rendered moot in view of Examiner's modified interpretation of DeKoning in view of Dimmick's teachings with respect Dekoning's second embodiment. In other words, Examiner maintains that once the second controller takes over for the failed first, the system is converted from a standalone server (i.e. first controller and two disks) to a JBOD set (i.e. host, second controller, data connections, and two disks). Since the second controller does not treat the two disks as an array (see rationale above provided in the rejection of claim 1), the system is "converted" to a JBOD set. Applicant's semantic argument is therefore not persuasive, and Examiner maintains Dekoning's system is in fact "converted" to a JBOD set once the standalone server fails, hence relinquishing control to the second controller.

Lastly, Applicant's characterization of Dekoning and Dimmick's disclosures as being dissimilar, hence rendering motivation to combine deficient, is not persuasive. Examiner maintains that it would have been obvious to an artisan of ordinary skill based on the reasons explicitly extracted from Dimmick's teachings, as presented in the rejection of claim 1, *supra*.

As for claim 7, Applicant contends that the cited references fail to teach installing an I/O module within the chassis. This argument however is not persuasive as Examiner maintains that Dekoning in view of Dimmick in fact render this limitation obvious, as per the rejection set forth *supra*.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

10. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on (571) 272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hyung S SOUGH/
Supervisory Patent Examiner, Art Unit 2188

/Craig E Walter/
Examiner, Art Unit 2188

CEW